CLAIMS

WHAT IS CLAIMED IS:

1. An image scanning apparatus, comprising:

an illuminating device for illuminating an original document;

a driving device for

relatively transferring said original document and its image scanning position,

assuming a plurality of areas where the transfer is to be performed at a long pitch, and a plurality of areas where the transfer is to be performed at a short pitch, included in each of the areas where the transfer is to be performed at a long pitch, said pitches being long or short in a sub-scan direction of said original document,

sub-scanning said original document at least once in said areas where the transfer is to be performed at a short pitch, by performing a small step transferring, and then sub-scanning said original document by performing a large step transferring, the small step transferring being the transfer performed at a short pitch, the large step transferring being the transfer performed at a long pitch, and

repeating the sub-scanning by performing the large step transferring and the small step transferring; and

an imaging device having at least two or more line sensors with equal line intervals on the surface of the imaging device, for outputting a plurality of image data from each of the line sensors, the line sensors receiving light from said original document in a plurality of pixels, the image data representing received light intensity by each of the plurality of pixels.

2. The image scanning apparatus according to claim 1, wherein said driving device only performs said large step transferring.

3. The image scanning apparatus according to claim 1, further comprising:

an image data combining device for digital-processing discrete image data of at least two lines or more outputted from said imaging device, and combining the digital-processed image data into data for one image.

4. The image scanning apparatus according to claim 1, wherein:

said illuminating device comprises a device for performing color separation illumination to separate said original document into two colors or more; and

said line sensors are monochrome CCD line sensors.

5. A storage medium for storing a controlling procedure of an image scanning apparatus, the image scanning apparatus comprising:

an illuminating device for illuminating an original document;

an original document transferring device for transferring said original document to an image scanning position; and

an imaging device having at least two or more line sensors with equal line intervals on the surface of the imaging device, for outputting a plurality of image data from each of the line sensors, the line sensors receiving light from said original document in a plurality of pixels, the image data representing received light intensity by each of the plurality of pixels, and wherein

said controlling procedure includes:

assuming a plurality of areas where the transfer is to be performed at a long pitch, in said original document, and a plurality of areas where the transfer is to be performed at a short pitch, included in each of the areas where the transfer is to be performed at a long pitch;

sub-scanning said original document at least once in said areas where the transfer is to be performed at a short pitch, by performing a small step transferring, and then sub-scanning said original document by performing a large step transferring, the small step transferring being the transfer performed at a short pitch, the large step transferring being

the transfer performed at a long pitch; and

repeating the sub-scanning by performing the large step transferring and the small step transferring.

6. A control program for an image scanning apparatus comprising:

an illuminating device for illuminating an original document;

an original document transferring device for transferring said original document to an image scanning position; and

an imaging device having at least two or more line sensors with equal line intervals on the surface of the imaging device, for outputting a plurality of image data from each of the line sensors, the line sensors receiving light from said original document in a plurality of pixels, the image data representing received light intensity by each of the plurality of pixels, and wherein

the control program comprises a scanning procedure of:

assuming a plurality of areas where the transfer is to be performed at a long pitch, in said original document, and a plurality of areas where the transfer is to be performed at a short pitch, included in each of the areas where the transfer is to be performed at a long pitch;

sub-scanning said original document at least once in said areas where the transfer is to be performed at a short pitch, by performing a small step transferring, and then sub-scanning said original document by performing a large step transferring, the small step transferring being the transfer performed at a short pitch, the large step transferring being the transfer performed at a long pitch; and

repeating the sub-scanning by alternately performing the large step transferring and the small step transferring.

7. An image scanning apparatus comprising:

an illuminating device for illuminating an original document;

a sub-scan stage for mounting an original document and transferring in a sub-scan direction;

an imaging device having two or more line sensors on the surface of the imaging device, for outputting a plurality of analog image data by the line sensor, the line sensors receiving light from said original document in a plurality of pixels, the image data being in a main-scan direction and representing received light intensity by each of the plurality of pixels;

a driving device for driving said sub-scan stage in a sub-scan direction; and

a maximum image data detecting device for obtaining image data by converting analog image data of two or more lines with an A/D converter and obtaining a maximum value of the obtained image data of the two or more lines, the analog image data being output in sequence from the two or more line sensors provided on said image device.

8. The image scanning apparatus according to claim 7, wherein

each of said two or more line sensors provided on said image device is constructed so as to divide outputs of said line sensors to be output from a plurality of taps which are provided in each of said line sensors.

9. The image scanning apparatus according to claim 7, further comprising a white balance detecting device for determining white balance, and wherein:

said illuminating device sequentially emits light in one or more color(s) during an initial exposure time which is determined in advance;

said imaging device receives reflective light from a reference white plate or light passing through a transparent window and outputs image data representing received light intensity by each pixel of said two or more line sensors, the reference white plate and the transparent window being provided on said sub-scan stage; and

said white balance detecting device determines white balance according to

maximum values for each color in the image data.

10. The image scanning apparatus according to claim 9, wherein

said white balance detecting device determines an exposure time necessary for obtaining white balance by dividing the maximum output of the A/D converter by the maximum value of the image data and multiplying the resultant by said initial exposure time.

11. The image scanning apparatus according to claim 10, wherein

said white balance detecting device calculates shading correction coefficients Snm for each color by dividing each of the A/D converted image data by the maximum value of the image data and obtaining shading correction coefficients Snm by each pixel of two or more line sensors, n of the Snm denoting a line sensor number, m denoting a pixel number, and both n and m being positive integers.

12. A storage medium for storing a controlling procedure of an image scanning apparatus, the image scanning apparatus comprising:

an illuminating device for illuminating an original document;

a sub-scan stage for mounting an original document and transferring in a sub-scan direction;

an imaging device having two or more line sensors on the surface of the imaging device, for outputting a plurality of analog image data by the line sensor, the line sensors receiving light from said original document in a plurality of pixels, the image data being in a main-scan direction and representing received light intensity by each of the plurality of pixels;

a driving device for driving said sub-scan stage in a sub-scan direction; and

a maximum image data detecting device for obtaining image data by converting analog image data of two or more lines with an A/D converter and obtaining a maximum value of the obtained image data of the two or more lines, the analog image data being output

in sequence from the two or more line sensors provided on said image device; and

a white balance detecting device for determining white balance, and wherein

said controlling procedure includes:

sequentially emitting light in one or more color(s) during an initial exposure time which is determined in advance;

receiving reflective light from a reference white plate or light passing through a transparent window and outputting image data representing received light intensity by each pixel of said two or more line sensors, the reference white plate and the transparent window being provided on said sub-scan stage; and

determining white balance according to maximum outputs for each color in the image data.

13. The storage medium according to claim 12, wherein

said controlling procedure includes determining an exposure time necessary for obtaining white balance by dividing a maximum output of the A/D converter by the maximum value of the image data and multiplying the resultant by said initial exposure time.

14. The storage medium according to claim 13, wherein

said controlling procedure includes determining shading correction coefficients Snm by each pixel of two or more line sensors by dividing the maximum output of the A/D converter by the exposure time necessary for obtaining white balance, n of the Snm denoting a line sensor number, m denoting a pixel number, and both n and m being positive integers.

15. The storage medium according to claim 1, wherein said controlling procedure includes calculating shading correction coefficients Snm for each color by dividing shading correction coefficients Snm by each pixel of two or more line sensors by the maximum value of the image data, n of the Snm denoting a line sensor number, m denoting a pixel number, and both n and m being positive integers.

16. a control program for image scanning apparatus comprising:

an illuminating device for illuminating an original document;

a sub-scan stage for mounting an original document and transferring in a sub-scan direction;

an imaging device having two or more line sensors on the surface of the imaging device, for outputting a plurality of analog image data by the line sensor, the line sensors receiving light from said original document in a plurality of pixels, the image data being in a main-scan direction and representing received light intensity by each of the plurality of pixels;

a driving device for driving said sub-scan stage in a sub-scan direction; and

a maximum image data detecting device for obtaining image data by converting analog image data of two or more lines with an A/D converter and obtaining a maximum output of the obtained image data , the analog image data being output in sequence from the two or more line sensors provided on said image device; and

a white balance detecting device for determining white balance, and wherein

said control program comprises procedures of:

sequentially emitting light in one or more color(s) during an initial exposure time which is determined in advance;

receiving reflective light from a reference white plate or light passing through a transparent window, and outputting image data representing received light intensity by each pixel of said two or more line sensors, the reference white plate and the transparent window being provided on said sub-scan stage; and

determining white balance according to maximum outputs for each color in the image data.

17. The control program according to claim 16, further comprising a procedure of

determining an exposure time necessary for obtaining white balance by dividing the maximum output of the A/D converter by the maximum image data and multiplying the resultant by the initial exposure time

18. The control program according to claim 17, further comprising a procedure of obtaining shading correction coefficients Snm by each pixel of two or more line sensors by dividing the maximum output of the A/D converter by the exposure time necessary for obtaining white balance, n of the Snm denoting a line sensor number, m denoting a pixel number, and both n and m being positive integers.

19. The control program according to claim 18, further comprising a procedure of calculating shading correction coefficients Snm for each color by dividing shading correction coefficients Snm by each pixel of two or more line sensors by a maximum value of the image data.